

ESTIMATING COST AND QUALITY IMPLICATIONS OF AN ONLINE SOLUTION
FOR THE ARMY ROTC MILITARY HISTORY REQUIREMENT

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General Studies

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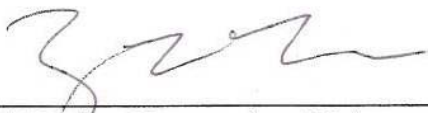
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ABSTRACT

ESTIMATING COST AND QUALITY IMPLICATIONS OF AN ONLINE SOLUTION FOR THE ARMY ROTC MILITARY HISTORY REQUIREMENT, by Major William J. Brooks, 87 pages.

This exploratory study attempted to estimate how the issues of cost and quality would be affected by employing an online solution as one method of accomplishing the Army ROTC military history requirement. Background on the Army ROTC program and the military history requirement are provided. A series of cost estimates were used to explore cost implications. A focused literature review, framed and complemented by the initial literature review, was used to explore implications regarding quality. Cost estimating identified the potential of a cost savings. Also, both the general and focused literature reviews were found to overwhelmingly support the notion that online learning was as good as, if not better than, face-to-face learning. Two recommendations were offered: further develop the issues in this exploration through a pilot study, and explore the feasibility of a linkage between the Army ROTC military history requirement and Defense Activity for Non-Traditional Education Support (DANTES) testing.

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ACRONYMS

AY	Academic Year
CC	Cadet Command
DoE	Department of Education
FTX	Field Training Exercise
ROTC	Reserve Officers' Training Corps
SMI	Senior Military Instructor

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CHAPTER 1

INTRODUCTION

Purpose and Organization

The purpose of this exploratory study is to determine how the issues of cost and quality would be affected by implementing a pure online solution in order to accomplish the Army Reserve Officers' Training Corps (ROTC) military history requirement. This study is organized into five chapters: introduction, literature review, methodology, analysis, and conclusions and recommendations. Within this chapter, the problem is framed by presenting a broad description of the Army ROTC program as it relates to the military history requirement. The author's line of thinking regarding the military history requirement is then introduced in a deliberate sequence: description, challenges, and potential solution. Next, the primary and secondary research questions are presented. Finally, other aspects relevant to this study are discussed, to include significance of this research, assumptions, limitations, and delimitations.

Background

Army ROTC Program Description

To earn a commission in the United States Army, an aspiring officer can take one of four paths: attendance at the United States Military Academy, completion of Officer Candidate School, earning of a direct commission, or completion of the Army ROTC program. Among these commissioning sources, ROTC is the largest producer of officers for the Army (Become an Officer n.d.). The Army ROTC program consists of a robust on- and off-campus leadership development program that is accomplished concurrently

with pursuit of a college degree (Department of the Army 1996; Department of the Army 2006). ROTC is administered by a mix of active duty Army officers and Non-Commissioned Officers, as well as civilian contract support (Department of the Army 1996; Communications Technologies Inc. n.d.). More than 270 colleges and universities throughout the United States host an Army ROTC program, and military science is offered by thousands of other affiliated institutions. (Locate Schools n.d.).

For the cadet, the Army ROTC program consists of several distinct components:

1. Physical Training. At most programs, physical training occurs three to five times per week. Cadets and cadre normally meet in the early morning to conduct a physical training session similar to those conducted in the active Army. This component of Army ROTC is naturally oriented toward the Army Physical Fitness Test (APFT), which is the Army's standard of measure for an individual's level of personal fitness (Department of the Army 2006).

2. Academic Courses. Eight courses, delivered one per semester through the cadet's education, provide a basic knowledge base about the Army. Academics are designed to complement the other components of the Army ROTC program and are organized into five consistent themes: leadership, personal development, values and ethics, officership, and tactics and techniques. From the successful accomplishment of these eight courses, the cadet is awarded 18 semester credits (or an equivalent amount of quarter credits). In addition to the eight core courses of the Army ROTC program, cadets are required to complete one course in military history (or the equivalent). This is known as the military history requirement and is the focus of this study (Army ROTC n.d.).

3. Leadership Training. Leadership skills and abilities are developed through the conduct and evaluation of small-group practical exercises which occur in a light infantry context. Cadets meet for two hours each week to participate in leadership lab training. Like physical training, the conduct of the leadership lab mirrors Army training: formation, accountability and announcements, conduct of training, After Action Review (AAR), final formation, and dismissal. This training consists largely of the use and practice of the eight Troop Leading Procedures and the five paragraph operations order to conduct squad and section-level tactical training (Army ROTC Senior Military Instructor, Telephone conversation with author, 24 November 2009).

4. Field Training Exercises (FTXs) during the AY. Once or twice during each semester, each Army ROTC program conducts a 48 to 72 hour FTX. In rare instances, such as at institutions with large wooded areas, FTX training can occur on-campus. However, in the majority of instances, FTX training occurs at nearby military installations or in state or national forests. Similarly to on-campus tactical training, FTX training mirrors Army field training and is designed to affect leadership development through the conduct of small unit tactical training using the operations order and eight Troop Leading Procedures. However, FTX training affords a more complex and robust training problem, as extended operations require the consideration of feeding, rest, equipment maintenance, and the like. This allows a richer level of leadership development to occur (Department of the Army 2006; Department of the Army 1996).

5. Optional Summer Leadership Development Training. Selected cadets are further developed through attendance at various training events during the summer break. Examples of this training include attendance at the U.S. Army Airborne School,

attendance at the U.S. Army Air Assault School, or participation in the Cadet Troop Lead Training program. Selection for these training events is normally very competitive (Department of the Army 1996).

6. Leader Development and Assessment Course (LDAC). Cadets typically attend LDAC, the capstone training and evaluation event in Army ROTC, between their third and fourth year in the program. LDAC consists of a six week training event at Fort Lewis, Washington, and is designed to accomplish three objectives: (1) evaluate each cadet's leadership ability and potential, (2) conduct further cadet leadership development; and, (3) provide an exciting and rewarding Army training experience to cadets, in preparation of becoming an Army officer (Department of the Army 1996).

7. Counseling and personalized feedback. Throughout the Army ROTC program, cadre frequently conducts both formal and informal counseling with cadets. This counseling is designed to appraise cadets on their performance and potential, as well as to serve as a source of support for the cadet as they struggle to balance the multiple challenges of college, Army ROTC, and adult life (Army ROTC Senior Military Instructor, Telephone conversation with author, 24 November 2009).

As indicated above, the cohort of cadets is organized into echeloned groups (called squads and platoons), which is structured exactly like an Army unit. This is done to facilitate the accomplishment of the week-to-week operations of such a complex and multi-faceted program in an orderly manner and to facilitate the iterative process of leadership development. Specifically, cadets participate in training in the various leadership positions based on their year group. Freshmen participate as trainees and are focused solely on task comprehension and performance. Sophomores participate as

trainees and occasionally as team leaders, focusing on task proficiency, as well as some leadership and supervision. Juniors participate as trainers, focused on the conduct of training, as well as leadership and supervision. Seniors participate as leaders and evaluators, focusing on ensuring the conduct of training to standard and the preparation of the juniors for attendance at LDAC (Army ROTC Senior Military Instructor, Telephone conversation with author, 24 November 2009).

Milestones

Within the Army ROTC program, several important developmental and administrative milestones exist. To a large degree, these milestones are sequential and describe the various gates through which the cadet must meet to proceed toward the earning of a commission:

1. Enrollment. After recruiting, the prospective cadet is screened to determine eligibility. Examples of screening criteria include academic performance, physical health, citizenship, and background. Once the prospective cadet passes initial screening, they are enrolled into the program (Department of the Army 1996).

2. Basic Course Qualification. Cadet Command describes the Army ROTC program in two parts: the basic course and the advance course. The basic course consists of the first two years of the program. Prior to beginning training in the advance course portion of the Army ROTC program, a cadet must be basic course qualified. Normally, this occurs by completing the first two years of Army ROTC. However, cadets may earn basic course qualification by other means, such as prior military service (called lateral entry). Additionally, students who desire to enroll in Army ROTC after the first semester of their freshman year can accelerate their basic course qualification through attendance

at Army ROTC's basic course compression course, the Leader's Training Course (LTC) (Army ROTC n.d.; Department of the Army 1996; Department of the Army 2006).

3. Contracting. Prior to beginning training in the advance course, cadets must contract into the reserve component of the Army. In addition to completing the various administrative requirements to contract, a cadet must be medically qualified by the Department of Defense Medical Examination and Review Board, passes the APFT, and is academically qualified. Contracting must occur before the start of the cadet's junior year, as well as prior to the cadet being awarded any scholarship benefits from Army ROTC (Department of the Army 1996).

4. LDAC. As mentioned previously, LDAC is the capstone training event for a cadet's Army ROTC experience. A cadet must successfully receive credit for attending LDAC prior to accessions (Department of the Army 2006).

5. Accessions. Upon return to campus after the successful completion of LDAC, cadets are accessed for placement in the Army. In addition to the needs of the Army, the accessions board considers the cadet's preference and performance when determining which branch and component the cadet will receive (Department of the Army 1996).

6. Pre-Commissioning Screening. While cadets' files are screened multiple times during their time in Army ROTC, added emphasis occurs through a deliberate and thorough pre-commissioning screening during a cadet's final semester. This screening ensures that the cadet has met all of the regulatory requirements to earn a commission (Army ROTC Senior Military Instructor, Telephone conversation with author, 24 November 2009).

7. Commissioning. Upon successful completion of all of the requirements of the previous milestones, and in conjunction with the awarding of a degree, the cadet is commissioned as an officer in the United States Army (Department of the Army 1996).

Military History Requirement

Regulatory direction is provided by DA, TRADOC, and CC describing the specific requirements needed to successfully meet each of the above-mentioned milestones. Within this body of regulation, CC Reg 145-3 describes the focus of this study, the military history requirement:

Prior to commissioning, cadets will complete a one-semester or equivalent college-level course in American military history offered by the college history department, or the ROTC Military History Course. The college-level course in American military history should develop the student's awareness of the relationship of the military establishment to society, particularly in the United States. Further, the course should develop their interest in the evolution of war and the progression of military professionalism, give them an awareness of the history and purpose of joint operations, discuss the role of history in understanding their profession, and encourage the viewing of American military history from a joint perspective (Department of the Army 2006, 8).

Additionally, the U.S. Army TRADOC addresses the military history requirement in TRADOC Regulation 350-13:

Based on common core requirements and prior to commissioning, Army ROTC Cadets will complete a one-semester or equivalent college-level course in military history from an academic department in the host institution. If the host institution does not offer such a course, Professors of Military Science (PMS) will conduct 45 contact hours in military history taught by designated military history instructors who have attended the Military History Instructor Course conducted annually by Combat Studies Institute. The required college-level military history course should develop students' awareness of the relationship of the military establishment to society, particularly in the United States. Further, the course should develop their interest in the evolution of war and the progression of military professionalism, give them an awareness of the history and purpose of joint operations, discuss the role of history in understanding their profession, and encourage the viewing of American military history from a joint perspective. (Department of the Army 1999, 5)

Challenges

Within this dynamic environment, where cadets attempt to balance their academic load with the requirements of Army ROTC and college life, several systemic and temporal challenges exist which complicate the accomplishment of the Army ROTC military history requirement. These include:

1. Density of Course Schedule. Army ROTC cadets endure a heavier course load than the typical college student. In addition to the normal general education and academic major requirements, cadets must fit eight Army ROTC courses and the military history course into their schedule. With many four-year degree programs, this causes Army ROTC cadets to consistently carry 17 or 18 credits per semester. Additionally, attendance at on- and off-campus training events reduce cadets' time available for studies, further exacerbating the challenge (Army ROTC Professor of Military Science, Office visit with author, 3 December 2009).

2. Military History as Elective Credit. Based on the course loads described above, Army ROTC cadets very frequently leave college with an abundance of elective credits that would not be required in order to simply graduate from the institution. These extra elective credits are often attributed to those extra academic requirements imposed by the Army ROTC program; normally, the military history requirement falls into this situation. To put this idea another way: except to satisfy the TRADOC and CC regulatory guidance, the military history course is normally not needed for a cadet's academic degree (Department of the Army 2006, Department of the Army 1999).

3. Procrastination. The military history requirement can be completed as late as the cadet's last semester, so the potential for procrastination with this requirement is high

in the face of so many other competing requirements. As mentioned above, as a last resort, the Professor of Military Science can conduct 45 hours of contact time teaching military history, but manning challenges make this tactic to be very inefficient and counterproductive (Army ROTC Professor of Military Science, Office visit with author, 3 December 2009)

4. Standardization of Military History Course Approval. No standardized vetting system exists to validate courses offered on-campus (Former Army ROTC Professor of Military Science, Office visit with author, 3 December 2009). This creates the potential for a number of substandard courses across the country to be fallaciously accepted to meet the established requirement. In sum, this pre-commissioning requirement may need further standardization.

5. Increasing Cadet Population. Cadet enrollment is significantly increasing. Attrition, shortages, and accelerated promotion timelines in the officer corps has resulted in a massive recruiting effort. During Fiscal Years 08-10, Army ROTC has and continues to enjoy high levels of recruiting due to the availability of virtually unlimited scholarship dollars (Ring, 2009). More cadets are now in need of opportunities to accomplish the military history requirement.

6. Escalating Tuition Costs. To satisfy the Army ROTC military history requirement, the vast majority of cadets complete a military history course on-campus at the host institution where they are enrolled. Occasionally, new cadets with transfer credit (at a less costly institution) may have previously completed a course that is considered satisfactory in meeting the military history requirement, but this is rarely the case. With the common scenario, tuition costs at the host institution should be considered, as they

can be surprisingly expensive. In extreme cases, tuition at private universities can exceed \$1,200 per credit hour, or \$3,600 per three hour course (Peterson's College Search, 2009). This issue becomes especially sensitive with the military history requirement, when considering that transfer credit for a satisfactory course (at a less costly institution) carries the same merit as credit granted at the host institution for the completion of a satisfactory on-campus course (at potentially a much higher cost).

7. Cadre Manning Challenges. Army manning priorities in support of operations in Iraq and Afghanistan result in a critical cadre shortage at many Army ROTC detachments (United States Army, 2008). Geographically separated partnership programs can be especially stretched. These shortages have the potential to severely degrade the cadre's ability to assume peripheral duties, such as obtaining the qualifications necessary to teach military history (Army ROTC Professor of Military Science, Electronic correspondence with author, 20 January 2010).

8. Reduced On-Campus Offerings. Fewer military history courses are available on some campuses. At some schools, the global economic downturn has resulted in a reduction of both the number of courses and sections offered at institutions across the country. As administrators decide which parts of the curriculum to curtail, low density courses such as military history are frequently high on the list (Army ROTC Professor of Military Science, Electronic correspondence with author, 20 January 2010). While it is possible to see this consideration as a short-term condition tied to the health of the national economy, it does suggest a benefit for being able to accomplish the military history requirement by other means.

Online Learning as a Potential Solution

Based on the above-mentioned challenges, the implementation of any efficiency that can be employed to reduce the burden to the cadet, cadre, or organization should be readily welcomed. It is this point where the author began to wonder if, or perhaps how, an online solution could be used to better accomplish the Army ROTC military history requirement. Several potential areas of improvement were identified. Specifically, benefits of online learning may include:

1. Cost Savings. How much money could be saved by implementing an online solution for the military history requirement? To indicate the potential of this notion, consider that the average annual tuition rate in the fiftieth percentile category for public four-year institutions is \$5,689 for AY 2007-2008 (Department of Education National Center for Education Statistics 2008). Using an average of 27 credits per AY, this translates to approximately \$632 per three-credit course. For private four-year institutions, the average annual tuition rate in the fiftieth percentile category is \$21,190, translating to approximately \$2,354 per three-credit course (Department of Education National Center for Education Statistics 2008). If an online solution could be developed that cost \$300 per student to administer, cost savings of at least \$332 for half of the public institutions and at least \$2,054 for half of private institutions could be realized. With more than 4,500 cadets commissioned annually from Army ROTC (Ring 2009), it is easy to see how the potential cost savings from an online solution could be measured in the hundreds of thousands of dollars.

2. Better Quality. A growing number of studies argue that online learning is, in terms of student outcomes (performance) and some unique qualitative characteristics,

superior to traditional, in-classroom learning (see chapters 2 and 4). If this was found to be the case with a course that strongly emphasizes declarative knowledge like military history, would not administrators and leaders be obligated to provide the highest quality learning solution--in this case online learning--for their cadets?

3. Standardization Across U.S. Army Cadet Command. With an online solution, instructional designers can achieve a level of standardization across U.S. Army Cadet Command in a way that could never be accomplished traditionally. This standardization can be leveraged to ensure that every cadet is exposed to those critical learning points intended in the design of this requirement. Again, this alternative suggests the possibility of a superior level of quality through online delivery.

4. Reduced Cadet Workload During the AY. One of the major advantages of online learning is that it can be received anywhere the student can access a computer with an internet connection. Leveraging this advantage, cadets could more easily accomplish the military history requirement outside the AY (during the summer). Doing this would not only reduce the cadet's workload during the school year, but would also allow the cadet more time for reading and comprehension, enabling a richer and more meaningful history experience.

5. Reduced Cadre Workload. Moving the military history requirement to an online course could be considered as outsourcing. This move would reduce cadre involvement in the management of their cadets' military history requirements. With an online solution, cadre involvement with this requirement would be simply to determine whether or not the cadet has completed the course. This is much less time consuming than the current method, where cadre must consider a number of dynamic factors,

including: (1) the cadet's academic workload; (2) the availability of history courses during the semester being considered; (3) whether or not any history courses available meet the requirement; (4) is there still room in those identified courses for the cadet to register; and, (5) how interested the cadet is in those particular courses.

6. Consistency. An online solution can consistently be delivered three or four times each year. This very effectively mitigates the reductions in course and section offerings that are occurring as a result of the recent economic downturn. Additionally, this consistency enables a new level of fidelity in constructing the cadets academic plan, as cadets and cadre would no longer have to wait for the upcoming semester's course schedule to be published to know what, when, and if suitable military history courses will be offered.

From this complex set of challenges, and in the context of online learning being able to offer a potential solution, the issues of cost and quality were selected to be the focus of this exploratory study.

Primary Research Question

Given the above context, the primary research question is offered: how would the issues of cost and quality be affected by implementing a pure online solution as one method of accomplishing the Army ROTC military history requirement?

Supporting Research Questions

To begin to address the primary research question, two supporting research questions are advanced. First, what are the cost implications of implementing a pure online solution in order to accomplish the Army ROTC military history requirement?

Second, what differences in quality would be realized by implementing a pure online solution in order to accomplish the Army ROTC military history requirement?

Significance

The significance of this study is that, if an effective solution can be identified, USACC could potentially deliver a product of superior quality, at a reduced burden to cadets, cadre, and the organization, at a significantly reduced cost. This could translate to an appreciation of military history at a level that is of greater depth and richness, while simultaneously saving non-scholarship cadets a significant amount of money and stretching USACC's scholarship dollars further. It is important here to be clear about this point: any cost savings realized by USACC can be leveraged to award more scholarships, which translates directly to the positive second-order effects of increased recruiting and retention. Additionally, this study has the potential to identify a better method of accomplishing the TRADOC-mandated Professional Military Education military history requirement, thus establishing a new standard of best practices.

Assumptions

This study assumes that the prescribed curriculum for Army ROTC, specifically the emphasis on military history, will not change for the foreseeable future.

Limitations

This study is limited by time constraints and the author's location of assignment. With regard to time, the author has approximately eight months within which to study the problem, develop and conduct research, and compose and defend his thesis. With regard to location of assignment, the author is located within driving distance of approximately

ten Army ROTC programs which he could personally visit; all other research, to include communication with USACC, will have to occur telephonically or via email.

Additionally, the author has virtually no funding with which to study the problem.

Finally, the author has limited experience in conducting original research, as this will be his second attempt at a project of this size.

Delimitations

This study is limited to exploring only the issues of cost and quality. The other potential benefits previously mentioned (standardization, reduced cadet workload during the AY, reduced cadre workload, and consistency) were delimited from this research.

Additionally, during his research, the author was referred to the various college credit examinations offered through the Defense Activity for Non-Traditional Education Support (DANTES), as a method of accomplishing the Army ROTC military history requirement (Department of Defense n.d.). These examinations included the College-Level Examination Program (CLEP) as well as the DANTES Subject Standardized Tests (DSST). The CLEP offers examinations for college credit in 34 subjects, including four in history. CLEP examinations cost \$72 (The College Board n.d.). The DSST program offers examinations in 38 subjects, including one titled “A History of the Vietnam War.” DSST examinations cost \$80, plus an administrative testing center fee (Prometric n.d.). While the concept of developing a CLEP or DSST examination (or possibly leveraging an existing examination) to accomplish the Army ROTC military history requirement has the potential of significant merit, it was beyond the scope of this research and was therefore delimited from this paper.

CHAPTER 2

REVIEW OF RELEVANT LITERATURE AND INFORMATION

Introduction

To restate, the purpose of this study is to determine how the issues of cost and quality would be affected by implementing a pure online solution as one method of accomplishing the Army ROTC military history requirement. This review of relevant literature and information is organized in a manner that corresponds with the main themes of the supporting research questions: cost and quality.

Cost

A well-developed body of literature addresses the issues of cost in online learning. During his research, the author identified two main themes associated with the issue of cost: categorization and models associated with cost and cost framework.

Categorization and Models

Through interviews with subject matter experts, Welsh, et al., identified three categories of course development (and cost) that require consideration during planning: training design, information technology infrastructure, and change management. Additionally, the notion of second-order cost savings associated with online learning is presented. These second-order cost savings include travel, lodging, meals, and the like. Finally, Welsh, et al., conclude by stating, “Research suggests that e-learning has the potential to be less expensive than classroom training if there are a large number of learners, if the learners are geographically dispersed, and if the course will be repeated several times” (2003, 253).

Sjogren and Fay suggest that as institutions of higher learning move into online education, the necessary comprehensive program development is routinely not effected. This approach is described as creating a condition where online learning is an “implementation as a marginal operation--one that is outside, rather than integrated into, the core functions of the institution” (Sjogren and Fay 2002, 53). To address this, four categories of development (with associated costs) are proposed: (1) course design; (2) course delivery and support; (3) faculty development; and, (4) student support. Within the category of course delivery and support, information technology infrastructure as well as learning management system development or contracting are identified as two significant considerations. With regard to student support, Sjogren and Fay highlight library support and other student services, such as advising, registration, financial aid, counseling, and the like.

Carr describes the insights gained from a series of six studies designed to explore the issues of cost and profitability in online education. Early in the article, Carr summarizes the studies’ findings by stating, “Their reports point to two broad conclusions: the universities aren’t losing a lot of money on distance learning, but they aren’t making much either--not yet” (2001, para. 9). To provide a position from the educational leadership perspective, Carr quotes an assistant dean at one of the universities that participated in the study, who said, “We pretty much broke even with the first year from a financial perspective, but from a non-financial perspective we did far better than that. The costs go way beyond what you think they are going to be, but so do the benefits” (2003, para. 13). One consideration suggested in this article is that institutions should tailor their approach to developing an online learning program based on the scope

of how big the program will be. Similarly to Sjogren, Carr advances two categories that will affect cost and quality: library access and other student services. A university administrator who participated in the study effectively summarizes these points:

It's one thing to put one course online. The costs are really easy to identify, and the faculty member can shoulder the burden of being the virtual university. But if we are going to grow our distance program to ten percent of our total operations, we have to look at the concept of a virtual university in a different way, because we won't be able to just Band-Aid together student support services. (Carr 2001, para. 39)

Wang discussed two separate models of quality assurance and best practices for online learning courses and programs. The first model, proposed by the Sloan Consortium, consists of five pillars of quality for online learning: learning effectiveness, access, student satisfaction, faculty satisfaction, and cost effectiveness. The second model, from the Council of Regional Accrediting Commissions, outlines five areas of best practices for online learning: institutional context and commitment, curriculum and instruction, faculty support, student support, and evaluation and assessment (Wang 2006).

Twigg describes the conduct and conclusions of an extensive program in online course redesign. Funded by an \$8.8 million grant from the Pew Charitable Trusts, this program analyzed and supported the redesign of online learning courses at 30 institutions of higher learning in an effort to obtain greater cost-effectiveness and improved quality. To do this, Twigg describes how the program of course redesign began with an evaluation of the effectiveness of each institution's current online learning courses "as measured by student performance and achievement" (2003, 30). Redesign interventions were then developed and implemented. Conclusions were presented in terms of both cost and quality. For cost, Twigg states, "Preliminary results show that all thirty institutions reduced costs by about 40 percent on average, with a range of 20 percent to 84 percent"

(2003, 30). With regard to quality, Twigg states, “Results show improved student learning in twenty of the thirty projects, with the remaining ten showing no significant difference” (2003, 30). Finally, Twigg reported a number of other qualitative improvements, to include increased course completion rates, improved retention, better student attitudes, and increased student satisfaction.

In addition to a broad overview of the program of redesign, Twigg describes the classification of the online courses studied in terms of how online learning is used to enhance quality and student learning. Within this classification, five models are presented:

1. The Supplemental Model. Courses that follow the supplemental model use online learning to supplement traditional classes on a college campus. These courses still use traditional methods as the primary vehicle for delivery, with online learning being used in a limited and augmentative capacity (Twigg 2003).

2. The Replacement Model. Courses in the replacement model category replace traditional course delivery with online course delivery. The most pure example of this technique is to deliver course content by way of real-time, synchronous webinars in lieu of a traditional classroom. In this model, online learning is used in a substitutive capacity (Twigg 2003).

3. The Emporium Model. Courses categorized into the emporium model category are based on the idea that the best time to conduct instruction is when the student wants to learn, as opposed to when class is scheduled or when the instructor wants to teach. This concept is rooted in Knowles’ andragogical assumption that learning is enhanced when the learner sees value in the content and is ready to learn (Knowles, Holton, and

Swanson 2005). To facilitate this, course material is posted online for the student to access asynchronously, at the time and place of their choosing. Twigg states, “The emporium model eliminates all class meetings and replaces them with a learning resource center featuring online materials and on-demand personalized assistance” (2003, 34).

4. The Fully Online Model. Similarly to the emporium model, the fully online model delivers the entire course online. However, in contrast to the replacement model, the fully online model offers courses that have three distinct characteristics: (1) courseware is used to deliver content; (2) the instructor focuses entirely on facilitating students’ learning of content; and, (3) a non-academic course assistant supports the instructor by assisting students with non-content related issues. To capture this concept, Twigg states, “The addition of a course assistant to address [non-content] related questions (which constituted 90 percent of all interactions with students!) and to monitor students’ progress frees the instructor to concentrate on academic rather than logistical interactions with students” (2003, 35).

5. The Buffet Model. The buffet model acknowledges that a student cohort is not a homogenous entity, but instead a group of individuals with a broad range of learning styles. To account for this, courses following the buffet model will offer several redundant learning tools for a single unit of content. For example, a student may find several varying formats of delivery, to include text documents, PowerPoint presentations, videos, audio recordings, and interactive tutorials for a single lesson within the online courseware for a particular course. This allows the student to pick and choose one or more delivery formats that are conducive to their preferred style of learning (Twigg 2003).

Cost Framework

Mantanovich describes the process and perceptions associated with converting a training seminar from a traditional method of delivery to an online delivery. A detailed description of the cost estimating associated with this process is provided, which includes the consideration of several variables, such as: (1) changes in value and quality as a result of changes in delivery medium; (2) second-order cost savings (travel, lodging, lost productivity to attend training, et cetera) from conversion to online; (3) economies of scale afforded by conversion to online; and, (4) customer perceptions of online learning being lower-cost. After conducting a thorough cost estimate in which these considerations are addressed, Mantanovich arrives at a number, but concludes, “That number is meaningless unless we believe we can command that in the competitive environment we face” (2004, para. 18).

Corbett and Visser describe the costs associated with three methods of course design and development. First, a traditional face-to-face course, designed by the course instructor, is estimated to cost \$3,500 in development. Second, an online course, designed by the course instructor, is estimated to cost \$20,000 in development. Third, an online course, designed by a course team (which presumably includes an instructional designer) is estimated to cost \$70,000 to develop. Additionally, Corbett and Visser note that class size is an important factor in online course design and development, and suggest the notion that design and development costs be expressed in cost per student.

In his article, Bulkeley describes the emergence of online courseware, such as Blackboard and WebCT, as the convenient, low-cost solution for individual professors and universities to transition courses to online delivery. Bulkeley describes the scalability

of courseware and its inexpensiveness, stating that courseware company Blackboard sells its software to colleges for \$4,500 to \$25,000, depending on program size. Additionally, Bulkeley explains the convenience of courseware by stating, “Using prepackaged CourseInfo and WebCT templates, professors are often getting their courses online in a week, instead of laboriously creating online course material from scratch or cobbling together standard Web-authoring programs” (1999, para. 10).

Bates, Bartolic-Zlomislic, and Associates

Perhaps the most comprehensive and thorough execution of the themes of categories, models, and cost framework is the work of Bates, Bartolic-Zlomislic, and Associates. This execution originated with Bates’ ACTIONS model for assessing learning technologies. The ACTIONS model describes a framework of seven categories to consider when developing online learning courses and programs. These include: Access, Costs, Teaching (and learning), Interaction (and user-friendliness), Organization, Novelty, and Speed (Bates 1995).

In their 1999 article, Bates and Bartolic-Zlomislic describe the results of independent case studies which studied institution and student-borne costs associated with online learning at three Canadian institutions (University of British Columbia, Toronto University, and Kwantlen University College). To do this, Bates’ ACTIONS model for assessing learning technologies was used as the framework for analyzing each case study. Five themes emerged from these three studies, including the theme of economic benefits. Within the theme of economic benefits, Bates and Bartolic-Zlomislic describe the specific performance of each of the institutions studied using framework of

cost factors, which included capital and recurrent costs, production and delivery costs, and fixed and variable costs (Bates and Bartolic-Zlomislic 1999).

The University of British Columbia hosted the first course in this study, which was found to be economically sustainable. Based on analysis of the first semester's delivery and a five-year future projection, it was forecasted that all development and delivery costs would be recouped by the third year, at which time the course would become profitable. Bates and Bartolic-Zlomislic also mention that the sharing of development costs with a partner institution in Mexico helped keep up-front costs low (Bates and Bartolic-Zlomislic 1999).

The results of the studies at the University of Toronto and Kwantlen University College were not as clear as the University of British Columbia. At the University of Toronto, the allocation structure of tuition received did not directly translate to a pro-rata share of department or course enrollment, thus confounding the comparison of income-to-expense. At Kwantlen University College, the course being studied was the first online or distance learning course ever offered at the institution. This resulted in a high amount of outsourcing and start-up costs, which convoluted income-to-expense comparisons (Bates and Bartolic-Zlomislic 1999).

Finally, in an effort to summarize the theme of economic benefits, Bates and Bartolic-Zlomislic state, "Online courses, under the right circumstances, and especially when developed through partnerships, can fully recover their costs, and can be at least as cost-effective as conventional courses" (1999, para. 31).

In a separate report, Bartolic-Zlomislic and Bates describe the study at the University of British Columbia, where an educational studies course was analyzed using

Bates' ACTIONS model for assessing learning technologies. Two perspectives were considered with regard to cost. First, the cost-effectiveness to the institution was addressed; could the revenues collected in tuition from this course cover the costs generated by its development, production, and delivery? Second, how did the costs paid by the individual student for the online course compare to the costs associated with the corresponding face-to-face course? For the income-to-expense comparison at the institution level, Barolic-Zlomislic and Bates calculated a \$9,015 loss during the first year, but projected the course to turn a profit during the following three years. Using this projection, the course was forecasted to recoup initial costs and become profitable in the second year. To obtain information about student costs, a survey was used to collect data from students in the course. Student estimation of a number of costs and expenses was gauged, including tuition, textbook costs, travel, internet costs, and parking. However, responses to this survey were remarkably few, and those that did respond indicated such a broad range of estimation on similar costs that the data extracted from this survey is highly suspect (Barolic-Zlomislic and Bates 1999).

Another important point in the University of British Columbia study is the articulation of profitability as a function of student enrollment. Combined with revenues per student, variable costs per student, and fixed course costs, Bartolic-Zlomislic and Bates suggest a calculation that described zones of profit and loss and the associated break-even point through the number of students enrolled in the course. For this study, the break-even point was identified at an annual enrollment of 44 students (Bartolic-Zlomislic and Bates 1999).

In a third report, Barolic-Zlomislic and Brett describe a very similar study at the University of Toronto where a research methods course was analyzed, again using Bates' ACTIONS model. The course in the University of Toronto study was delivered using the WebCSILE courseware application as opposed to the HyperNews courseware application that was used in the University of British Columbia study. As in the previous study, cost-effectiveness to both the institution and the student were addressed. Barolic-Zlomislic and Brett calculated a \$922 profit the first year with an increasing profit projected out to five years. Unlike the course studied at the University of British Columbia, the course at the University of Toronto was calculated as being profitable from the first year. However, some fixed costs of development and delivery, labeled as 'overhead,' could not be figured (Barolic-Zlomislic and Brett 1999).

Barolic-Zlomislic and Brett met with the same challenges as Barolic-Zlomislic and Bates in calculating and comparing student costs. Additionally, the profitability calculation using student enrollment was again demonstrated. For this study, the course break even point was initially calculated at 5.31 students annually but was forecasted to increase as unaccounted 'overhead' costs were further articulated (Barolic-Zlomislic and Brett 1999). Finally, in an effort to complement the three preceding reports, the author attempted to locate a separate report on the study at Kwantlen University College but was unsuccessful. The author suspects that such a report was never completed, was not published, or has been lost.

Bartley and Golek propose a cost matrix to compare costs of online courses with those of traditional courses. The justification for such comparison is that the issue of cost may end up being the only discriminating factor between online and face-to-face

learning: “Given the lack of conclusive research concerning the effectiveness of online education, cost comparison factors may serve as the primary criterion to determine which methodology to use” (Bartley and Golek 2004, 167). This cost matrix builds upon the work of Bartolic-Zlomislic and Associates by acknowledging and addressing the same types of costs: capital and recurrent, production and delivery, and fixed and variable. In addition to the cost matrix, Bartley and Golek discuss and advocate the use of the Return On Investment (ROI) calculation as a valid method of comparing online and face-to-face course costs. Simply put, the ROI calculation is the ratio of income (generated by tuition and fees) to expenses (as articulated in the cost matrix) of a single course or program of multiple courses. Finally, Bartley and Golek describe the need for further study and research in this area:

Overall, the need for the financial justification of the conversion to online instructional programs is necessary. The cost matrix is a proposed tool to assist education and training professionals to begin discussion regarding costs associated with online programs in their universities or organizations. In addition, experimental evidence through continued study of comparisons of the benefits and costs of online and face-to-face instruction would be beneficial. (2004, 174)

Quality

A significant body of literature addresses the notion of quality in online learning; there are literally hundreds of studies of this topic. During his research, the author identified two main themes of study: absolute comparisons between online and face-to-face learning, and qualitative study that extends beyond absolute comparisons. Both themes are discussed below. Additionally, the author’s attempts to locate a study that specifically addresses a comparison of online and face-to-face sections of an undergraduate history course are described.

Absolute Comparison

The author found dozens of articles that attempted to provide an absolute comparison of online and face-to-face sections of the same course or block of instruction. Individually, the overwhelming majority of these studies depict online learning as equal to or slightly better than face-to-face learning when measuring student performance or improvement. To provide a flavor of this research, four such articles are reviewed.

In 1999, Thirunarayanan and Perez-Prado attempted to make an absolute comparison by measuring the difference between student pre-test and post-test scores in online and face-to-face sections of an undergraduate elementary education course. Twenty-nine students in an online section and 31 students in a face-to-face section were administered a pre-test at the beginning of the semester, which assessed students' mastery of core concepts in elementary education as well as concepts and ideas related to the specific course being taught. The course was then taught through the semester in the usual manner; both sections participated in individual and group exercises, class presentations, and quizzes and examinations. Online students interacted with the virtual classroom using the WebCT computer application and email, while face-to-face students interacted in the traditional manner. At the end of the semester, the same assessment used as the pre-test was re-administered as a post-test. Differences in pre-test and post-test scores were averaged for each student. Next, the mean difference for each section was calculated; this was the unit of measure for comparison. The face-to-face section averaged a 13.19 point improvement between the pre-test and post-test, while the online section averaged a gain of 15.21 points. While perhaps not statistically significant, Thirunarayanan and Perez-Prado summarize their findings by saying, "Students in the

online section of the course achieved more than their classroom-based counterparts,” thus indicating that online learning was superior to face-to-face learning in this study (Thirunarayanan and Perez-Prado 2002, 131).

Poirier and Feldman compared mean examination and writing assignment scores for online and face-to-face sections of an undergraduate introductory psychology course. Twelve students in the online section and nine students in the face-to-face section completed nearly-identical sets of assignments which included textbook reading assignments, group discussions, three two-page writing assignments, and four proctored examinations. The face-to-face section received in-class lecture, while the online section did not. Students in the online section interacted using the eCollege course delivery platform and email, while students in the face-to-face section employed traditional means for interaction. Additionally, face-to-face students were asked to participate in three threaded discussions online using the WebCT computer application. Results of this study showed that students in the online section outperformed students in the face-to-face section when comparing mean examination scores (79.63 percent versus 71.93 percent), and that mean writing assignment scores were nearly equal (6.85 for the online section versus 6.86 for the face-to-face section). Poirier and Feldman summarize their findings by saying, “The results suggest that students enrolled in online courses perform at least as well as students enrolled in traditional courses” (2004, 61).

Aberson, Berger, Healy, and Romero compared the effectiveness of an online tutorial to a standard laboratory assignment when teaching null hypothesis significance testing in an undergraduate introductory statistics course. Fifteen students participated in the online tutorial, while ten students participated in a standard laboratory assignment. A

ten question comprehension test was administered at the first meeting following the completion of the lab assignment. Adjusted means of the two groups' comprehension test grades were compared. The online tutorial group's adjusted mean was 7.50, with the standard laboratory assignment group posting a 6.14 average. Aberson, Berger, Healy, and Romero summarize their findings by saying, "A test of comprehension suggested that our Web-based tutorial may be more effective than a standard laboratory assignment to teaching concepts of null hypothesis significance testing" (2003, 77).

Gilliver, Randall, and Pok compared online and face-to-face sections of an undergraduate financial accounting course. An existing face-to-face course was converted to an online course at a cost of approximately \$14,000. During the study, 111 students participated in the online section and 333 students participated in a face-to-face section. While the face-to-face section closely resembled a traditional college course, the online section leveraged numerous internet technology strategies to enhance learning, including: synchronous chat sessions using the Microsoft NetMeeting computer application, a student-developed class home page, an instructor-developed FAQ page, and supplemental material packages tailored for students based on their self-assessments (slow, average, and advanced). Study results showed that the online group outperformed the face-to-face group when section mean and median scores were compared (71.4 percent versus 64.5 percent and 71.7 percent versus 64.2 percent, respectively). Gilliver, Randall, and Pok summarize their findings by concluding, "The use of information technology resources in education does improve pedagogic outcomes" (1998, 212).

In addition to the four studies of absolute comparison discussed above, the author found dozens of others reporting similar results. For example, Dellana, Collins, and West

compared the performance of students in online and face-to-face sections of an undergraduate course in management science and found no significant statistical differences. Additionally, Jennings compared the performance of students in online and face-to-face sections of an undergraduate business course and found that, “Students performed at a nearly identical level for both online and traditional delivery methods” (2003, para. 1). Further, Ocker and Yaverbaum used a pair of case study exercises to compare the collaborative capabilities of online and face-to-face learning of students in a graduate-level information systems course and found that, “Asynchronous collaboration is as effective as face-to-face collaboration in terms of learning, quality of solution, solution content, and satisfaction with the solution quality” (1999, 427). Similarly to Ocker and Yaverbaum, Loar used a case study framework to compare online and face-to-face sections of a block of instruction in a graduate nurse practitioner course and found that, “There was no difference in either declarative knowledge or clinical performance between those students who completed a text-based case study and those students who completed a computer-simulated case study” (2007, iii). Finally, Neuhauser compared student performance in online and face-to-face sections of a university business course and found, “No significant differences in the test scores, assignments, participation grades, and final grades, although the online group’s averages were slightly higher” (2002, 99). In addition to performance, responses from student end-of-course questionnaires in Neuhauser’s study revealed that, “Ninety-six percent of the online students found the course to be either as effective or more effective to their learning than their typical face-to-face course” (2002, 99).

As is apparent, the consistent theme with regard to absolute comparisons of online and face-to-face learning is that they are equal in quality. From his review of the body of research, the author would summarize absolute comparisons of online and face-to-face learning in the following way: five percent of research found face-to-face learning to be superior to online learning, 35 percent found online to be superior to face-to-face, and 60 percent found online and face-to-face to be equal. This assessment is shared by Twigg, who states, “Comparative research studies show that rather than improving quality, *most* technology-based courses produce learning outcomes that are simply ‘as good as’ their traditional counterparts--in what is often referred to as the ‘no significant difference’ phenomenon” (2003, 28).

Study Beyond Absolute Comparison

In addition to making absolute comparisons, many studies have explored the qualitative or characteristic differences of online and face-to-face learning. To provide a flavor of this extensive and broad body of research, articles from four categories are presented and discussed: student perceptions, accountability and motivation, instructor-student communication, and academic integrity.

Student Perceptions

Cooper studied student perceptions and compared distribution of grades in online and face-to-face sections of an undergraduate fundamentals of computer applications course. Thirty-seven students participated in the online group, and 94 participated in the face-to-face group. Comparison of the distribution of grades shows that a larger percentage of online students earned an A (32.4 percent versus 14.0 percent), and a

smaller percentage of online students earned a D or F, or withdrew (5.4 percent versus 6.3 percent, 5.4 percent versus 9.5 percent, and 5.4 percent to 12.7 percent, respectively).

In addition to studying grade distribution, Cooper administered a very robust end-of-course survey that masterfully captures a number of important student perceptions. This survey found that the majority of online students agreed that online learning was “easier to learn at a self-directed pace” (62.5 percent), “lowers the indirect cost of education (travel, babysitter, etc.)” (50.0 percent), and that online learning “makes it easier to manage work and school” (81.0 percent) (2001, 56). Additionally, survey results showed that 100 percent of students surveyed agreed that the college should offer both formats of classes, thus “giving students the option of internet or traditional instruction” (2001, 56). As a result of her studies, Cooper concludes that, “Online classes can provide an effective educational environment and offer a viable alternative to traditional classroom instruction” (2001, 58).

Buckley compared mid-term and final exam performance, as well as student perceptions, of students on online, face-to-face, and hybrid sections of an undergraduate nursing course. Fifty-eight students participated in this study, in three sections of the course: 24 in the face-to-face group, 11 in the online group, and 23 in the hybrid group. Course delivery in the face-to-face section consisted of 15 traditional classroom sessions, which consisted of a lecture, followed by a question and answer session. Delivery of the hybrid section was similar to the face-to-face section, with the addition that supplemental instructional materials were made available to students through the WebCT courseware application. The online section was delivered exclusively through the internet and included the use of file sharing (syllabus, assignments, etc.), online assessment tools,

synchronous chat sessions, and asynchronous threaded discussion. In her analysis, Buckley found no significant differences in mid-term or final examination scores between the three sections.

Buckley used her university's standard course evaluation, consisting of a 27 item questionnaire that quantifies student perceptions of the course, including objectives and assignments, testing, instructor preparation and commitment, textbooks, and instructor-student interaction. Buckley also solicited student comments. Upon analysis of the course evaluations, it was noted that the hybrid section received the most favorable rating, followed by the face-to-face section. The online section was rated lowest. Additionally, Buckley received several insightful student responses, which stratify both the positive and negative aspects of each of the three sections.

Schmeeckle compared both student performance and perceptions of online and face-to-face sections of an undergraduate course in jail management. Schmeeckle states, "Results indicated that online training is as effective an instructional method as classroom training, and more efficient . . . no meaningful learning differences occurred between the two groups, but online training was completed in almost half the time of classroom instruction and at a lesser cost" (2003, 205). Additionally, Schmeeckle found that student perceptions described a balance between the favorable and unfavorable aspects of online learning: "Trainees stated the biggest disadvantage of online training was missing classroom interaction, but this was countered by the convenience and time efficiency of online training" (2000, para. 2).

Bee and Usip studied student perceptions in online and face-to-face sections of an undergraduate course in quantitative economics. In the questionnaire used to obtain

student perceptions, significant emphasis was placed on understanding students' internet usage patterns within their daily lives. Results from students in the face-to-face section (called non-users in the study) included attitudinal responses such as: "They simply didn't have time to devote to learning how to use the internet," and "They had no desire to even learn how to use the internet" (1998, para. 18). Students in the online section (called users), however, indicated that online learning was "a good method of obtaining information," a "necessary prerequisite for future learning," a "valuable means for collecting data," and "efficient" (1998, para. 21). Bee and Usip noted that one of the reasons students enjoyed online learning is because they had instant access to an unlimited supply of information and could 'surf' the Web to fill gaps in background knowledge, articulate points for clarification, or provide additional learning material for interesting items beyond the pre-determined scope of the course. In current informal parlance, this is referred to as the "Wiki effect."

Accountability and Motivation

Mentzer, Cryan, and Teclehaimanot compared test scores and final grades of students in online and face-to-face sections of an undergraduate philosophy course. Each section of this study consisted of 18 students. The administration of the VARK survey of learning preference determined that no statistically significant difference regarding learning preference existed between the groups. Emphasis was placed on creating as similar a learning experience as possible between the online and face-to-face sections. Both sections had the same syllabus, reading, writing assignments, and assessments. Additionally, attendance counted equally in each section's grading strategy and was measured online by student attendance in synchronous chat sessions. Mentzer, Cryan, and

Teclehaimanot concluded that, “Student performance on tests was equivalent; however, student final grades were lower in the Web-based course due to incomplete assignments” (2007, 233). Based on their conduct of the study, as well as student feedback on end-of-course evaluations, the notion of accountability and motivation was advanced to address the incomplete assignments and corresponding lower final grades in the online group: “Conclusions suggest that the face-to-face encounter motivates students to a higher degree and also provides students with another layer of information concerning the instructor that is absent in the Web-based course” (2007, 233).

McNamara, Swalm, Stearne, and Covassin attempted to compare student increases in knowledge and performance in online, face-to-face, and hybrid sections of a 16 week undergraduate course in beginner weight training. Differing amounts of technology were used to enable the three distinct sections of the course. Online students learned by watching video demonstrations over the internet and were allowed to exercise on their own schedule. Face-to-face students attended scheduled classes for instruction and regimented practice. Students in the hybrid group exercised on their own during scheduled class periods and “used technology in moderation” (2008, 1166). End-of-course assessments included a written knowledge test measuring pre- and post-test differences, as well as two performance tests (bench press and squat) which measured student increases in lifting ability. While not statistically significant, the online group posted the largest increase in written knowledge of the three sections. With regard to the bench press performance test, the online group posted results that were significantly lower than the face-to-face or hybrid sections. No significant differences were reported for the squat performance test.

Upon further examination, however, the author has serious questions about this study's validity; specifically, the distribution of male and female subjects in the control and experimental groups is skewed: females make up 14.8 percent (4 of 27) of the face-to-face (control) group, but account for 40.7 percent (11 of 27) of the online (experimental) group. Very possibly, differences in performance and improvement between male and female bench press abilities confound the results of this study. However, despite their potential shortcomings in section homogeneity, McNamara, Swalm, Stearne, and Covassin draw conclusions that are insightful to the study of accountability and motivation in online learning: "Possible reasons for a lack of improvement in the online group included lack of motivation, low accountability, and the possibility that the self-reported workouts were not accurate" (2008, 1164).

Instructor-Student Communication

Jang, et al. compared knowledge gains and interpretation abilities of undergraduate nursing students in online and face-to-face blocks of instruction in electrocardiography. Fifty-four students participated in the face-to-face (control) group, while 51 participated in the online (experimental) group. Both blocks of instruction lasted four weeks, where face-to-face students received traditional, lecture-based instruction and online students received a self-paced learning program that combined traditional instruction with interactive Web pages. The results of the study were mixed: face-to-face students posted larger gains in knowledge (when comparing mean differences of pre- and post-test assessments), but online students performed better at interpreting electrocardiograms. Jang, et al. account for these mixed results in two ways. First, they submit that the weaker performance in knowledge gains is a result of reduced motivation

and lack of understanding of expectations. Jang, et al. argues the need to provide sufficient initial guidance to online students in order to ensure that they understood the efforts and actions expected of them. Similarly, Jang, et al. noted that positive encouragement can motivate online students to fully embrace the concepts of active learning, and that the researchers of this study may have fallen short in this regard. They state, “To make Web-based learning effective, instructors must provide more guidance to students and encourage students’ active learning. This may be a limitation of this study because the instructors were not able to devote enough time to guide the students. In addition, one hour of orientation may not have been enough to motivate the students to learn using online courses” (2005, 38). Second, Jang, et al. suggests that the superior ability of the online section in electrocardiogram interpretation is a positive result of the interactive Web-based learning program, which was visually stimulating and which enabled self-paced learning.

Bata-Jones and Avery compared mean mid-term and final examination scores of undergraduate nursing students in online and face-to-face sections of a 15 week pharmacology course. Fifty-two students participated in the face-to-face section, and 18 students participated in the online section. Students in the online section had the same instructor and examinations as the face-to-face section. Additionally, the online section was required to use the WebCT computer application to participate in asynchronous discussion, report the results of a field trip they were to take in their local area, and participate in a prescription writing practical exercise. Bata-Jones and Avery found no significant differences between the mean scores of the online and face-to-face sections for the mid-term or final examinations. Additionally, Bata-Jones and Avery administered

an end-of-course survey to obtain student feedback about the course. To summarize, they state, “Overall, students in the course were positive about their experience. Student comments highlight the need to be aware of effectiveness of communication among faculty and students, the clarity of instructions, and the amount of information on course Web sites” (2004, 185).

Gagne and Shepherd compared student performance and perceptions in online and face-to-face sections of a graduate level introductory accounting course. With the same instructor, textbook, syllabus, and deliverables, face-to-face students participated in a traditional 17 week on-campus version of the course, while online students used synchronous chat, asynchronous discussion threads, email, telephonic communications, and virtual workspaces to participate in the online version of the course. Major deliverables included mid-term and final exams, as well as three projects during the semester. In their study, Gagne and Shepherd found no significant differences between the performance of online and face-to-face sections: “The performance of students in a distance course was similar to the performance of students in the on-campus course” (2001, 64). However, analysis of student perceptions did reveal a significant difference in student perceptions of instructor accessibility: “In responding to instructor availability, there was a significant difference. This finding is supportive of a common belief that interacting with the instructor and/or with other students is somewhat hampered in a distance learning course” (2001, 64).

Bello, et al. used a pre- and post-test model to compare performance of post-graduate anesthesiology residents in online and face-to-face blocks of instruction on airway management. Knowledge gains, as measured by the differences in pre- and post-

test scores, were measured using both a written assessment and a practical skills test. The face-to-face section participated in a five hour block of traditional classroom instruction, and the online section received a 36 hour period of access to instructional materials through the Blackboard courseware application. Additionally, online students participated in synchronous chat and asynchronous question and answer sessions with instructors. Results showed no significant differences in pre- and post-test gains between the sections, in either the written assessment or the practical skills test.

In addition to an absolute comparison, Bello, et al. invested significant effort in creating a level of student-instructor interaction in the online section that was comparable to the face-to-face section through the use of the synchronous chat application. Research results indicated that this objective had been exceeded, as learners in the online section reported a significantly higher level of satisfaction than that of the face-to-face section.

Bello, et al. articulate this point and its implications:

The fact that overall learner satisfaction ratings by online students were significantly higher than those of the traditional classroom students is consistent with the findings of others. It is important to recall that, unlike most online medical courses evaluated thus far, ours was designed to maintain interaction between students and instructors by means of threaded discussion forums in which instructors also provided real-time responses to students' queries. In a recently published report, the lack of personal contact with instructors was the most commonly perceived limitation of online teaching. The importance of such interaction is confirmed by the high rates of student participation in the interactive sessions included in our online course. Students' responses to the learner satisfaction questionnaire indicated that the quality of online student-instructor interaction was identical to that experienced in the classroom, although the natures of the two types of interaction are obviously different. (2005, 551)

Academic Integrity

The author felt it important to explore the literature for research that addressed the notion of academic integrity in online learning. During his research, the author found one

such article. Ridley compared cumulative GPAs of online and face-to-face students over time to look for trend evidence of a breach in academic integrity. Ridley theorized that, due to their remoteness from instructors, online students have a greater capability to commit violations of academic integrity, and that such behavior would be indicated by an increase in online students' cumulative GPAs that is not consistent with their face-to-face counterparts. Through his research though, Ridley ultimately disproved his hypothesis and concluded that, "The concerns raised by some academics regarding online education, although legitimate, are exaggerated if not unfounded" (1998, para. 1).

Comparison of Online and Face-to-Face History Course

While conducting this research, the author committed several hours attempting to locate a study that specifically addressed the comparison of online and face-to-face sections of an undergraduate history course. Several attempts were made using a variety of keyword searches in several of the major search engines. The author found a study by Vess, which studied the integration of iPods and podcasting of course material into a graduate level history course. Additionally, a study by Bass and Rozenweig was found that discusses general considerations and recommendations for integrating technology into the teaching of history. However, no direct comparison of online and face-to-face was found, and to the author's knowledge, no such study has been conducted.

Summary

In summary, literature and information relevant to the issues of cost and quality was reviewed. Two major themes were identified with regard to cost: categorization and models, and cost framework. Additionally, two major themes were identified with regard

to quality: absolute comparisons and qualitative studies that extend beyond absolute comparison. The author's research methodology will be discussed in chapter 3.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

To restate, the purpose of this study is to determine how the issues of cost and quality would be affected by implementing a pure online solution in order to accomplish the Army ROTC military history requirement. This chapter describes the methodology that was used in this research, by providing a description of the method of study that was used for each supporting research question. Additionally, significant issues relating to the conduct of this research are addressed, to include protections for human subjects, validity, and reliability.

Cost

The first supporting research question was: what are the cost implications of implementing a pure online solution in order to accomplish the Army ROTC military history requirement? To address this question, a series of cost estimates was calculated to compare the current cost paid to receive a three-credit course (status quo) with the cost paid to receive a three-credit course through an online solution. Two methods were developed and used to calculate a cost estimate for the status quo: the high-cost schools method and the percentile method. To calculate a cost estimate for an online solution, the online community college method was developed and used. Cost estimates for the status quo were then compared to cost estimates for an online solution, to identify potential cost implications.

Quality

The second supporting research question is: what differences in quality would be realized by implementing a pure online solution in order to accomplish the Army ROTC military history requirement? To address this question, a focused literature review was conducted that further developed and refined the points discussed in chapter 2. Literature that the author found significant and especially compelling to this study is presented in chapter 4, and the author's conclusions of this literature are presented in chapter 5.

Protections for Human Subjects

An initial assessment indicates that no portion of this research project poses the likelihood of physical, social, economic, psychological, or legal risk to any persons affiliated. The author spent considerable time with the CGSC Subject Matter Expert for research approval discussing his research, to ensure compliance with CGSC Bulletin 40, other Department of Defense policies and directives, federal regulations, and the Belmont Report.

Validity and Reliability

The issues of validity and reliability were considered, to ensure the integrity of the research. The researcher attempted to establish face validity for this study by providing research details to and soliciting input from multiple Subject Matter Experts in fields of education, educational technology, educational research, and military science. Additionally, reliability for quantitative data, such as cost estimating, was ensured through repetitive calculation. Finally, reliability for qualitative data, such as with the literature review, was ensured through proper sourcing.

Summary

In summary, a comparison of cost estimates was constructed to determine the implications associated with the issue of cost, and a focused literature review was used to address the issue of quality. Additionally, due diligence was exercised to ensure research complied with CGSC Bulletin 40, Department of Defense policies and directives, federal regulations, and the Belmont Report. Finally, numerous efforts were taken to address validity and reliability.

CHAPTER 4

ANALYSIS

Introduction

To restate, the purpose of this study is to determine how the issues of cost and quality would be affected by implementing a pure online solution as one method of accomplishing the Army ROTC military history requirement. This chapter describes the analysis and process that was used in conducting this research. As with previous chapters, this chapter is organized using the themes of cost and quality.

Cost

The first supporting research question is: what are the cost implications of implementing a pure online solution in order to accomplish the Army ROTC military history requirement? To address this question, several cost estimates that focus on cost paid to receive a three-credit course will be calculated and compared.

Estimating the cost paid to receive a three-credit course is important because this is the amount that CC and the non-scholarship cadet pay to accomplish the Army ROTC military history requirement. For CC, a cost savings realized here could result in a potentially significant extension of the purchasing power of the CC scholarship account, thus enabling more scholarships to be awarded; this is one of the central points of this thesis.

In addition to estimating cost paid to receive, a second set of cost estimates that explored the three-credit course from the perspective of the community college was considered. The author debated using a process similar to the work done by Bates,

Bartolic-Zlomislic, and Associates or Bartley and Golek to describe the sustainability and profitability of developing and administering a three-credit course (like military history). However, the author ultimately decided against this series of estimates, as the profitability of courses is not of significant relevance or interest to this study or CC.

Three approaches were used to estimate the cost of a three-credit course. The first two approaches attempted to articulate what is currently being paid for a three-credit course (such as the Army ROTC military history requirement) at the more costly Army ROTC programs across the country. The third approach attempted to estimate the cost of a potential substitution to the status quo--accomplishment of the Army ROTC military history requirement through a low-cost, accredited community college by way of online learning. First, the high-cost schools approach used analyses of the most expensive public and private institutions with an Army ROTC program on-campus. Second, the percentile approach used rates of tuition and fees from the National Center of Educational Statistics. Third, the online community college approach surveyed rates of tuition and fees of accredited community colleges across the United States that had online learning programs. The results of the first two approaches were then compared to the results of the online community college approach.

High-Cost Schools Approach

To estimate the cost of a three-credit course using the high-cost schools approach, the author began by conducting a Google search, using the phrase “Most Expensive U.S. Colleges and Universities.” Among others, the search returned an article titled, “Most Expensive U.S. Colleges and Universities” from a Pearson Education information Web site called “InfoPlease” (Pearson Education, Inc. n.d.). Upon review, the author noted that

the InfoPlease article referenced an online college search database maintained by a company named Peterson's. The Peterson's college search database was used to obtain tuition and fees information for estimating the cost of a three-credit course using the high-cost schools approach (Peterson's n.d.).

Separate searches were performed to identify public and private schools within the Peterson's database. Search results included the name and location of the institution, as well as the average annual in-state tuition. A broad set of search parameters were used, which included: (1) country (United States); (2) tuition range (up to \$25,000 or more); and, (3) types of colleges (public or private, and 4-year). Search results were exported into a Microsoft Excel spreadsheet and were sorted by cost of in-state tuition and fees, from high to low. Starting with the most expensive, institutions on this list were then vetted to identify whether or not an Army ROTC host or partnership program was established on that institution's campus. Two methods were used to determine if an Army ROTC host or partnership program was located on an institution's campus.

With the first method, a Google search was used to attempt to locate an Army ROTC program Web site at the institution. For example, to determine if an Army ROTC program was established at the University of South Carolina, the author Googled, "University of South Carolina Army ROTC." The Google search returned a direct link to the University of South Carolina Army ROTC program Web site, thus verifying the existence of an Army ROTC program at that institution. It is important to note that care had to be exercised using this method, as some institutions do not have an Army ROTC program, but are affiliated with an Army ROTC program at another nearby institution. These affiliated institutions frequently have Army ROTC content on their Web site,

which links to the Army ROTC program at the other institution. For example, a Google search using the phrase “The University of George Washington Army ROTC” will return a link through The University of George Washington Web site, to the Georgetown University Army ROTC Web site. In this case, Georgetown University is the institution with the Army ROTC program, and The University of George Washington is the affiliate.

The second method used to determine if an Army ROTC host or partnership program was the school locator tool on the Army ROTC recruiting Web site (Department of the Army n.d.). Using this school locator tool, lists of host and partnership programs, as well as affiliated institutions, were generated for cross-referencing with the Peterson’s search results.

Using these two methods, the author identified the 25 most expensive institutions for both public and private colleges and universities (see tables 1 and 2). A mean value was then calculated for tuition and fees for each group. These means were then divided by an estimated annual enrollment of 33 credit hours, to obtain a mean estimated cost per credit hour. This mean estimated cost per credit hour was then multiplied by three, to obtain the estimated cost for a three-credit course for both the 25 most expensive public and private colleges and universities with an Army ROTC program. For the 25 most expensive public institutions, the mean annual cost for tuition and fees was calculated to be \$9,821.80. This translates to a mean cost per credit hour of \$297.63, and a mean cost per three-credit course of \$892.89. For the 25 most expensive private institutions, the mean annual cost for tuition and fees was calculated to be \$37,562.04. This translates to a mean cost per credit hour of \$1,138.24, and a mean cost per three-credit course of \$3,414.73 (see table 3).

Table 1. Twenty-five Most Expensive Public Institutions with an Army ROTC Program On-Campus

Institution	City	State	Annual In-State Tuition
The University of Texas at Arlington	Arlington	TX	\$8,186
Illinois State University	Normal	IL	\$8,220
University of Rhode Island	Kingston	RI	\$8,238
University of Illinois at Chicago	Chicago	IL	\$8,342
The Ohio State University	Columbus	OH	\$8,406
South Carolina State University	Orangeburg	SC	\$8,462
University of Delaware	Newark	DE	\$8,540
Kent State University	Kent	OH	\$8,726
The Citadel	Charleston	SC	\$8,735
University of South Carolina	Columbia	SC	\$8,756
The University of Texas at Austin	Austin	TX	\$8,930
Ohio University	Athens	OH	\$8,973
University of Minnesota	Minneapolis	MN	\$9,120
University of Illinois	Champaign	IL	\$9,484
Rutgers	New Brunswick	NJ	\$9,546
University of New Hampshire	Durham	NH	\$10,080
Central Michigan University	Mount Pleasant	MI	\$10,170
Michigan State University	East Lansing	MI	\$10,410
Michigan Technological University	Houghton	MI	\$10,500
Temple University	Philadelphia	PA	\$11,174
Clemson University	Clemson	SC	\$11,487
University of Vermont	Burlington	VT	\$11,712
University of Michigan	Ann Arbor	MI	\$12,400
University of Pittsburgh	Pittsburgh	PA	\$13,344
Penn State University Park	University Park	PA	\$13,604

Source: Peterson's, College Search, <http://www.petersons.com/ugchannel/code/searches/srchCrit1.asp> (accessed 28 November 2009).

Table 2. Twenty-five Most Expensive Private Institutions with an Army ROTC Program On-Campus

Institution	City	State	Annual In-State Tuition
University of San Francisco	San Francisco	CA	\$34,430
Northeastern University	Boston	MA	\$34,950
Princeton University	Princeton	NJ	\$35,340
Tulane University	New Orleans	LA	\$35,500
University of Miami	Coral Gables	FL	\$35,540
Santa Clara University	Santa Clara	CA	\$36,000
Loyola University Maryland	Baltimore	MD	\$36,510
Duke University	Durham	NC	\$37,485
Massachusetts Institute of Technology	Cambridge	MA	\$37,510
Georgetown University	Washington	DC	\$37,536
Vanderbilt University	Nashville	TN	\$37,632
Villanova University	Villanova	PA	\$37,725
Cornell University	Ithaca	NY	\$37,750
Washington University in St. Louis	St. Louis	MO	\$37,800
Boston University	Boston	MA	\$37,910
University of Notre Dame	Notre Dame	IN	\$37,970
Northwestern University	Evanston	IL	\$38,088
Wake Forest University	Winston-Salem	NC	\$38,206
Lehigh University	Bethlehem	PA	\$38,330
Dartmouth College	Hanover	NH	\$38,445
University of Southern California	Los Angeles	CA	\$38,570
The Johns Hopkins University	Baltimore	MD	\$39,150
Dickinson College	Carlisle	PA	\$39,780
Carnegie Mellon University	Pittsburgh	PA	\$40,300
Bucknell University	Lewisburg	PA	\$40,594

Source: Peterson's, College Search, <http://www.petersons.com/ugchannel/code/searches/srchCrit1.asp> (accessed 28 November 2009).

Table 3. Cost of a Three-Credit Course Using the High-Cost Schools Approach

Type of Institution	Mean Annual Cost of Tuition and Fees for the 25 Most Expensive Institutions with an Army ROTC Program	Mean Cost Per Credit Hour (Based on 33 Credit Hour Annual Enrollment)	Mean Cost of a Three-Credit Course
Public 4-Year	\$9,821.80	\$297.63	\$892.89
Private 4-Year	\$37,562.04	\$1,138.24	\$3,414.73

Source: Created by Author with data from Peterson's, College Search <http://www.petersons.com/ugchannel/code/searches/srchCrit1.asp> (accessed 28 November 2009).

Percentile Approach

To estimate the cost of a three-credit course using the percentile approach, the author used table 333, *Undergraduate tuition and fees and room and board rates for full-time students in degree-granting institutions, by percentile of charges and control and type of institution: 2000–01 through 2007–08*, from the Department of Education (DoE), National Center for Educational Statistics. Tuition and fee rates for the school year 2007–08 were extracted for public and private 4-year institutions (see table 4). Similarly to the high-cost approach, these values were then divided by an estimated annual enrollment of 33 credit hours to obtain an estimated cost per credit hour. The estimated cost per credit hour was then multiplied by three to obtain an estimated cost of a three-credit course. For public institutions, the cost of a three-credit course was estimated between \$305.00 (10th percentile) and \$809.73 (90th percentile), with a median of \$517.18 (see table 5). For private institutions, the cost of a three-credit course was estimated \$1,101.82 (10th percentile) and \$3,194.73 (90th percentile), with a median of \$1,926.36 (see table 6).

Table 4. Excerpt from NCES Table 333: 2007-08

Type of Institution	Tuition and Fees				
	10th Percentile	25th Percentile	50th Percentile (Median)	75th Percentile	90th Percentile
Public 4-Year	\$3,355	\$4,264	\$5,689	\$7,272	\$8,907
Private 4-Year	\$11,130	\$14,100	\$21,190	\$27,966	\$35,142

Source: Department of Education, National Center for Education Statistics (DoE NCES), *Undergraduate tuition and fees and room and board rates for full-time students in degree-granting institutions, by percentile of charges and control and type of institution: 2000–01 through 2007–08 (Table 333)*, July 2008, http://www.nces.ed.gov/programs/digest/d08/tables/dt08_333.asp?referrer=list (accessed 20 September 2009).

Table 5. Cost of a Three-Credit Course Using the Percentile Approach (Public Institutions)

	Tuition and Fees				
	10th Percentile	25th Percentile	50th Percentile (Median)	75th Percentile	90th Percentile
Annual Cost	\$3,355.00	\$4,264.00	\$5,689.00	\$7,272.00	\$8,907.00
Cost Per Credit Hour	\$101.67	\$129.21	\$172.39	\$220.36	\$269.91
Cost of a Three-Credit Course	\$305.00	\$387.64	\$517.18	\$661.09	\$809.73

Source: Created by Author with data from DoE NCES, *Undergraduate tuition and fees and room and board rates for full-time students in degree-granting institutions, by percentile of charges and control and type of institution: 2000–01 through 2007–08 (Table 333)*, July 2008, http://www.nces.ed.gov/programs/digest/d08/tables/dt08_333.asp?referrer=list (accessed 20 September 2009).

Table 6. Cost of a Three-Credit Course Using the Percentile Approach (Private Institutions)

	Tuition and Fees				
	10th Percentile	25th Percentile	50th Percentile (Median)	75th Percentile	90th Percentile
Annual Cost	\$11,130	\$14,100	\$21,190	\$27,966	\$35,142
Cost Per Credit Hour	\$337.27	\$427.27	\$642.12	\$847.45	\$1,064.91
Cost of a Three-Credit Course	\$1,011.82	\$1,281.82	\$1,926.36	\$2,542.36	\$3,194.73

Source: Created by author with data from DoE NCES, *Undergraduate tuition and fees and room and board rates for full-time students in degree-granting institutions, by percentile of charges and control and type of institution: 2000–01 through 2007–08 (Table 333)*, July 2008, http://www.nces.ed.gov/programs/digest/d08/tables/dt08_333.asp?referrer=list (accessed 20 September 2009).

Online Community College Approach

To estimate the cost of a three-credit course using the online community college approach, the author conducted an online search of community colleges throughout the United States. Search results were vetted to ensure that community colleges considered were properly accredited and that offered online courses through courseware such as Blackboard. Out-of-state residency status was used when calculating estimates for tuition and fees. During his search, the author found costs for an online three-credit course that ranged from as low as \$213 to more than \$1,100. The three lowest-cost accredited online community colleges that the author found are listed in table 7. By averaging these three values, the cost of a three-credit course using the online community college approach is estimated to be \$331.40.

Table 7. Out-of-State Tuition and Fees for a Three-Credit Course Taken from a Community College Online

Community College	City	State	Out-of-State Tuition	Required Fees	Total Cost
Yavapai Community College	Prescott	AZ	\$213.00	\$0.00	\$213.00
Santa Fe Community College	Santa Fe	NM	\$219.00	\$88.20	\$307.20
St. Louis Community College	St. Louis	MO	\$474.00	\$0.00	\$474.00

Source: Yavapai Community College. *Tuition, fees, budget*. (<http://www.yc.edu/content/admissions/tuition-fees-budget.htm>, accessed 01 December 2009); Santa Fe Community College. *Tuition and fees for credit enrollment*, http://www.sfccnm.edu/registration/tuition_and_fees (accessed 1 December 2009); St. Louis Community College. *Tuition and fees*, http://www.stlcc.edu/Admissions_and_Registration/Tuition_and_Fees/ (accessed 1 December 2009).

Comparison

Once estimates were calculated, they were compared to identify any potential cost implications that could be associated with implementing an online solution for the Army ROTC military history requirement. The resulting estimates from the high-cost schools and percentile approaches (for both public and private institutions) were compared against the results from the online community college approach. In all four comparisons, a cost savings was identified (see table 8).

Table 8. Cost Savings Calculations for a Three-Credit Course

Approach	Estimated Cost	Less Estimated Cost Using the Online Community College Approach	Potential Cost Savings Per Cadet
High-Cost Schools Approach (Public)	\$892.89	\$331.40	\$561.49
Percentile Approach (50th Percentile, Public)	\$517.18	\$331.40	\$185.78
High-Cost Schools Approach (Private)	\$3,414.73	\$331.40	\$3,083.33
Percentile Approach (50th Percentile, Private)	\$1,926.36	\$331.40	\$1,594.96

Source: Created by Author with data from DoE NCES, *Undergraduate tuition and fees and room and board rates for full-time students in degree-granting institutions, by percentile of charges and control and type of institution: 2000–01 through 2007–08 (Table 333)*, July 2008, http://www.nces.ed.gov/programs/digest/d08/tables/dt08_333.asp?referrer=list (accessed 20 September 2009); Peterson’s, College Search, <http://www.petersons.com/ugchannel/code/searches/srchCrit1.asp> (accessed 28 November 2009).

Quality

The second supporting research question is: what differences in quality would be realized by implementing a pure online solution in order to accomplish the Army ROTC military history requirement? To address this question, a focused literature review was conducted that further developed and refined the points discussed in chapter 2.

This literature review builds upon the foundation established in chapter 2. To be sure, the vast majority of studies cited in chapter 2 depict online learning as equal to or better than face-to-face learning in an absolute comparison of student performance.

However, the literature review in chapter 2 was primarily intended to provide a survey of the type of research being conducted as well as an idea of the issues being explored. This literature review was aimed specifically at answering the second supporting research question. Toward that effort, the most significant and profound literature that relates to the notion of quality in online learning is presented below. During his research, the author found seven reports that present the most compelling research conducted to date and which he considered the essential reading when addressing the notion of quality in online learning. These include qualitative research: Mikulecky's 1998 research into the dynamics of discussions; Sun, Lin, and Yu's 2008 study of elementary school science labs, Schoenfeld-Tacher, McConnell, and Graham's comparisons of content interactions using Bloom's taxonomy; as well as quantitative research: the Florida TaxWatch 2007 report on the Florida Virtual School; Wisher, Olson, and Moses' 2003 meta-analysis for the U.S. Army Research Institute for Behavioral and Social Sciences; Sitzmann, Kraiger, Stewart, and Wisher's 2006 meta-analysis; and, the DoE 2009 meta-analysis.

Focused Literature Review

Mikulecky

Mikulecky conducted a qualitative comparison of discussions on censorship in three separate sections of a graduate adolescent literature class. The first section, a face-to-face section, conducted the discussion entirely as a class. The second section, also a face-to-face section, broke into small groups for 40 minutes, then came together as a class for the last 20 minutes to present small group insights; Mikulecky refers to this technique as a jigsaw discussion. The third section, an online section, conducted the entire discussion asynchronously through a threaded discussion application.

The first section's class discussion proceeded for the 40 minutes allotted. During that time, Mikulecky noted that the instructor took on a very central place in the dynamic. Specifically, he notes the following qualitative observations:

1. Early exchanges in the discussion involved the instructor answering practical questions about the discussion topic by offering examples and recommendations.
2. The instructor actively maintained discussion by directing and redirecting the focus as well as soliciting students' experiences, opinions, and observations.
3. Throughout the conversation, the instructor summarized and emphasized points that she considered to be important.

With regard to the second section's jigsaw discussion, Mikulecky reported two important qualitative observations. First, he notes that, as students broke out into small groups, a significant portion of time was devoted to socializing, confirming discussion and reporting expectations between small group members, and negotiating how the small group will present to the class. Second, Mikulecky noted that the small group dynamic facilitated a more personal experience for the students, which enabled a deeper level of discussion to occur than could be found in the class discussion. Examples of this richer discussion experience include the occurrence of students sharing of personal experiences as well as the occurrence of correlation of ideas in reading assignments to each other.

Mikulecky describes the conduct of the online asynchronous threaded discussion by saying:

The class produced approximately 14,000 words of discussion. This is the equivalent of . . . two hours of oral discussion (assuming speaking rates of 120 wpm). Slightly more than two thirds of the students participated on this discussion topic with many students offering several quite lengthy observations, responses, and counter-responses. (1998, 87)

Specific qualitative observations of the online discussion included the following:

1. Students provided rich descriptions of situations, challenges, and solutions that often exceeded 200 words.
2. Students frequently responded to other students, thus removing the instructor from the center of the dynamic.
3. In addition to cognitive participation, students participated affectively by sharing difficult professional experiences, as well as providing support to each other.
4. Students had the time and space to allow debates to mature.

To summarize his observations and position, Mikulecky writes, “The written nature of electronic discussion led to more thoughtful student exchanges than has usually been my experience in 20 years of teaching in university classrooms” (1998, 88).

Sun, Lin, and Yu

Sun, Lin, and Yu compared online and face-to-face groups in an elementary school science lab. Using a pre- and post-test design, 65 students in the online section and 67 students in the face-to-face section completed a single lab experiment. Results revealed that, “Students in the experimental group using the online virtual lab achieved better grades than those in the control group under traditional class instruction” (2008, 1411). Additionally, Sun, Lin, and Yu account for the superior performance of the online group by reporting two noteworthy observations. First, they noted that the ability to repeat instruction in the online group “powers cognition and helps to build up science conceptions more efficiently” (2008, 1421). Second, Sun, Lin, and Yu note that online learning can address space limitations associated with classroom scheduling, and online

learning “breaks the limit of time for lab classes,” meaning that students can obtain further repetition and practice outside of normal class hours (2008, 1421).

Schoenfeld-Tacher, McConnell, and Graham

Schoenfeld-Tacher, McConnell, and Graham used a quantitative pre- and post-test design to compare online and face-to-face sections of a graduate course in histology. Additionally, student interactions in the course were qualitatively analyzed and classified using Bloom’s taxonomy for the cognitive domain. Quantitative results revealed that students in the online section outperformed their peers in the face-to-face section. Further, qualitative results revealed that online students had a greater proportion of higher-level interactions, taking information from comprehension and application to analysis, synthesis, and evaluation.

Florida TaxWatch

The first piece in this literature review describes how the Florida TaxWatch Center for Educational Performance and Accountability compared the quality of Florida Virtual School (FLVS) middle and high school students with that of their counterparts enrolled in traditional middle and high schools throughout the state. For the reader unfamiliar with the FLVS program, Florida TaxWatch provides a brief description:

The Florida Virtual School (FLVS) is an on-line educational program that uses the Internet to provide course instruction to middle and high school students. Students log into the classes, access the lessons, and work on assignments and projects. They set their own pace but must maintain active involvement to continue in the course. Florida-certified instructors are utilized, and many of them also hold national certification through the National Board of Professional Teaching Standards. Teachers guide the lessons, assess student work and provide constructive comments and grades. They also communicate by telephone with students and their parents. (2007, 5)

Two measures of student performance were used to compare quality of education: scores on the Florida Comprehensive Assessment Test (FCAT) and scores on the College Board Advanced Placement (AP) examinations. Analysis was conducted using three independent data sources for School Years (SYs) 04-05 and 05-06. Student populations for FLVS during these school years totaled 48,000 and 68,000, respectively. To summarize their research findings, Florida TaxWatch states, “FLVS students outperformed their statewide counterparts on two independent assessments, both the Florida Comprehensive Assessment Test and Advanced Placement Examinations” (2007, 2). A review of FCAT data confirms this statement: FLVS students consistently and decisively outperformed their traditional counterparts in both math and verbal sections, through all grades reported (six through ten). Even more impressive is the performance of FLVS students on AP exams as compared to their traditional counterparts. AP exam score averages were 2.89 for FLVS students versus 2.54 for public school students during SY 04-05, and 3.05 versus 2.49 for SY 05-06 (2007, 19-20). The significance of this performance is noted by Florida TaxWatch:

The data regarding Advanced Placement examination findings are particularly compelling. These courses represent a national curriculum, and the tests are graded by experts throughout the country. Further, recent national research has indicated that students earning a score of 3 or higher in one or more of the AP exam core course areas of English, mathematics, science, or social studies were more likely to graduate from college in five years or less when compared to non-AP students. (2007, 20)

Wisher, Olson, and Moses

Wisher, Olson, and Moses conducted a meta-analysis on research involving Web-based instruction for the U.S. Army Research Institute for the Behavioral and Social Sciences. A meta-analysis is a systematic collection of relevant literature, which enables,

“combining the results of multiple experiments or quasi-experiments to obtain a composite estimate of the size of the effect” (Department of Education 2009, xiii). The entering of several key words and phrases into two reference databases yielded more than 500 scholarly reports related to Web-based instruction. This large group was narrowed to 47 reports, by excluding articles that did not contain empirical evidence of instructional effectiveness. These 47 were studied thoroughly to determine if they contained sufficient data from which an effect size could be computed. Using this discriminator, the field of 47 was further narrowed to 15 reports. An analysis of the average effect size from these 15 reports indicated that Web-based (online) instruction was superior to traditional classroom (face-to-face) instruction. In their findings, Wisher, Olson, and Moses state, “In terms of instructional effectiveness, it appears that current practices in Web-based instruction lead to an improvement in learning when compared to the classroom” (2003, vii).

Sitzmann, Kraiger, Stewart, and Wisher

Similarly to Wisher, Olson, and Moses’ 2003 study, Sitzmann, Kraiger, Stewart, and Wisher applied meta-analytic techniques to the existing body of research comparing online and face-to-face learning. Sitzmann, et al. used three strategies to obtain 96 relevant reports. First, a keyword search was performed using several online reference databases. This keyword search yielded 3,461 reports of potential relevance. A title and abstract review narrowed the field from 3,461 to 249. The field was again narrowed; the 249 reports were read and studied, and from them 59 reports were identified as relevant. Second, an offline search for literature was performed by reviewing the reference lists of influential studies in online learning as well as reviewing the Journal of Asynchronous

Learning Networks. These manual searches yielded 33 additional relevant reports. Finally, numerous efforts to obtain unpublished research resulted in an additional four relevant reports for the meta-analysis. Ultimately, 96 reports were included in the meta-analysis, describing the experiences of 19,331 students in 168 courses. A modified effect size was calculated for each study, and effect sizes were compiled for analysis. Like Wisner, Olson, and Moses, the meta-analysis conducted by Sitzmann, et al. indicated that online learning was superior to face-to-face learning. Sitzmann, et al. state, “The overall results indicated [that] Web-based instruction was six percent more effective than classroom instruction for teaching declarative knowledge, the two delivery media were equally effective for teaching procedural knowledge, and trainees were equally satisfied with Web-based instruction and classroom instruction” (2006, 623).

The DoE 2009 Meta-Analysis

While the previous two meta-analyses are clearly impressive in scope and comprehensiveness, the 2009 report from the U.S. DoE is the most current and most significant meta-analysis that the author found on the issue of online learning. Authors of the 2009 report introduce their charter by stating:

Earlier studies of distance learning concluded that these technologies were not significantly different from regular classroom learning in terms of effectiveness. Policy makers reasoned that if online instruction is no worse than traditional instruction in terms of student outcomes, then online education initiatives could be justified on the basis of cost efficiency or need to provide access to learners in settings where face-to-face instruction is not feasible . . . Policy-makers and practitioners want to know about the effectiveness of Internet-based, interactive online learning approaches and need information about the conditions under which online learning is effective. (Department of Education 2009, xi)

In that context, authors of the DoE study asked: “How does the effectiveness of online learning compare with that of face-to-face instruction?” (2009, xi). To address this

question, a systematic, computerized search was conducted for research literature that studied online learning during the period of 1996 to July 2008. Four screening criteria were used to identify relevant reports: (1) online and face-to-face conditions were contrasted, (2) student outcomes were measured, (3) a rigorous research design was used, and (4) the study provided adequate data to calculate an effect size. This search yielded 1,132 prospective reports. Through abstract and article review, these 1,132 reports were paired down to 176 that were found to have used an experimental or quasi-experimental design. From this group of 176, 99 reports were identified to have meaningfully studied the contrasting condition, and were included in the meta-analysis or the supporting narrative.

The over-arching findings of the U.S. DoE's comprehensive study on online learning are concisely stated in the report: "the meta-analysis found that, on average, students in online learning conditions performed better than those receiving face-to-face instruction" (2009, ix). Additionally, the key finding is presented, that states, "students who took all or part of their class online performed better, on average than those taking the same course through traditional face-to-face instruction" (2009, xiv). Further commentary in the report reveals numerous other insights. For example, key features that make online learning successful are discussed, such as giving students control of their pace and path of learning, prompting learner reflection and self-monitoring through proper instructional design, and allowing learning to extend beyond the period of time for a traditional class session through repetitive interaction with instructional materials (Department of Education, 2009).

Summary

The analysis and process used in this research were presented, using the themes of cost and quality. To address the issue of cost, a series of cost estimates was calculated to compare the current cost paid to receive a three-credit course (status quo) with the cost paid to receive a three-credit course through an online solution. Cost estimates for the status quo were then compared to cost estimates for an online solution, and a cost savings was identified with the online learning solution. To address the issue of quality, a focused literature review was conducted that further developed and refined the points discussed in chapter 2. Literature that the author found significant and especially compelling to this study was presented. Conclusions elicited from the analysis in this chapter are presented in chapter 5.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

To restate, the purpose of this study is to determine how the issues of cost and quality would be affected by implementing a pure online solution as one method of accomplishing the Army ROTC military history requirement. This chapter describes the conclusions that were derived from this research, as well as the resulting recommendations.

Conclusions

Cost

Based upon a comparison of the cost estimates, it appears that the potential for a significant cost savings exists. For example, using the high-cost schools approach for public institutions, implementing the online solution for four cadets from each of the 25 high cost schools would potentially result in a cost savings of \$56,149 ($4 \times 25 \times \$561.49 = \$56,149$). For a broader example, using the median value for tuition in the percentile approach for public institutions, implementing the online solution for 1,000 cadets in the Army ROTC cohort (roughly 20 percent) would potentially result in a cost savings of \$185,780.

Even larger potential cost savings can be demonstrated, using the same logic for private schools. It is important to note, however, that both public and private institutions can employ a flat-rate tuition structure, which charges a fixed fee that is not tied to number of hours taken. The use of this rate structure is more common by private

institutions, and its use negates any potential cost savings of accomplishing the military history requirement through a low-cost online community college. The commonality of this fee structure threatens the validity of the high-cost schools method for private institutions, and it is for this reason that the author feels that the potential cost savings would be overestimated by drawing conclusions from the high-cost schools model for private schools.

While still a concern for the percentile approach, the ability to identify individual schools with an enrollment-based tuition structure is possible, and thus a significant cost savings could be realized. For example, if ten private schools were identified that employed an enrollment-based tuition structure, and whose rates were above the median value (50th percentile) as described in table 6, the diversion of four cadets from an on-campus military history course to an online solution would result in a cost savings of more than \$63,798 ($4 \times 10 \times \$1,594.96 = \$63,798$).

Ultimately, any cost savings realized could manifest themselves in one of two ways: (1) the total cost to provide a given number of scholarships would decrease, resulting in a cost savings for USACC, its parent organizations, and the Army in general; or (2) the cost-per-scholarship would decrease, enabling the awarding of more scholarships from a given amount of funding. In sum, depending on the command's priorities, employing an online solution for the Army ROTC military history requirement has the potential to result in a reduced cost to operate USACC's general scholarship fund, or better purchasing power within the general scholarship fund, resulting in the ability to award more scholarships.

Quality

Based on the literature reviewed, which was a consolidation from a broad review of existing research, strong qualitative evidence indicates that online learning is superior to face-to-face learning in terms of quality. These qualitative superiorities include the following:

1. Online learning enables a deeper and more meaningful interaction with other students using asynchronous threaded discussions (Mikulecky 1998).
2. Online learning affords more efficient and effective learning through its inherent capability to repeat instructional material (Sun, Lin, and Yu 2008).
3. Online learning enables the improvement of student performance through the elimination of classroom-based time constraints (Sun, Lin, and Yu 2008).
4. Online learning, through asynchronous threaded discussion tools, results in more frequent affective interactions, as well as higher-level cognitive interactions between students (Mikulecky 2008; Schoenfeld-Tacher, McConnell, and Graham 2001).

In addition to a qualitative superiority, reviewed literature demonstrates consistently strong quantitative evidence that online learning is as good as, if not superior to, face-to-face learning. Supporting justification for this conclusion includes:

1. Of the 19 articles cited under quality in chapter 2, 15 found online learning to be superior or equal to face-to-face learning (six superior, nine equal, one inferior, and three inconclusive).
2. The remarkable strengths of the Florida TaxWatch study, to include the use of state and nationally-recognized standardized measurements (FCAT and AP exam scores) on such a large population, give its findings considerable merit and weight.

3. Similarly to the strengths associated with the Florida TaxWatch report, the breadth of scope and comprehensive process of research conducted lend significant and definitive merit to the findings of the three meta-analyses cited. Additionally, it is important to note that the DoE's 2009 meta-analysis will likely be received as key document for future determinations of policy and practice regarding online education in the United States.

Therefore, in response to the second supporting research question, the author concludes that implementing a pure online solution in order to accomplish the Army ROTC military history requirement would result in a quality of learning that would likely be superior to, but certainly as good as, the face-to-face solution that is currently being used.

Summary of Conclusions

From his research to answer the two supporting research questions, the following conclusions were drawn: (1) using an online solution from an accredited, low-cost community college, a cost savings may be able to be realized that directly translates to additional four-year full tuition scholarships for CC; and (2) the quality of online learning has been proven to be at least equal, if not superior to face-to-face learning.

It is important to note that many situations do and would exist where an online solution would not be appropriate for a particular school. The reasons for this condition are numerous, and include: (1) the cost savings is not significant (less-costly schools and schools with a flat-rate tuition structure), (2) institutions with a high-quality and/or supportive history program, and (3) institutions that would not accept the transfer of credits from a community college. In contrast, there are likely situations where an online

solution would be the ideal method of accomplishing the Army ROTC military history requirement at a particular school. Such situations would include: (1) institutions with a high cost enrollment-based tuitions structure (cost savings), and (2) institutions with few or no course offerings that satisfy the military history requirement (quality). It is for these reasons that the author suggests the potential for implementation of an online solution as one of many ways to accomplish the Army ROTC military history requirement; or to put it metaphorically: one of many arrows in the quiver.

Recommendations

Based on the conclusions of this study, two recommendations are offered: (1) further development of this concept, to include a pilot study; and (2) exploration of feasibility to link the Army ROTC military history requirement with DANTES.

Further development of the concepts explored in this paper is recommended. Specifically, this development should include a pilot study, which compares the administration of a military history course to Army ROTC cadets through online and face-to-face methods. From this type of pilot, numerous aspects of the issue can be studied, including: (1) feasibility of administering an online course (from the Army ROTC program, USACC, and community college perspectives), (2) actual cost implications, (3) actual quality implications, (4) attitudes and opinions of cadets enrolled in online and face-to-face sections, and (5) profitability and sustainability of the online solution from the community college's perspective.

Additionally, exploration of the feasibility of linking the Army ROTC military history requirement to DANTES testing is recommended. Ideally, the development of a test through either the CLEP or DSST programs specifically designed for the Army

ROTC military history requirement should be explored. If determined possible, this could be another extremely low-cost method of helping cadets accomplish the Army ROTC military history requirement.

Summary

In summary, this study explored how the issues of cost and quality would be affected by implementing a pure online solution as one method of accomplishing the Army ROTC military history requirement. An introduction was provided in chapter one, which included the background of the topic, as well as the primary and supporting research questions. Relevant literature regarding both cost and quality was reviewed in chapter two. The author's methodology was described in chapter three. Analysis of the issue was then presented in chapter four, including a series of cost estimates and a focused literature review. Finally, conclusions were presented in chapter five: a cost savings potentially exists, and research has concluded that online learning is as good as, if not better than, face-to-face learning. Recommendations for future development of this issue included the development of a pilot study, as well as the exploration of linking the Army ROTC military history requirement to DANTES.

Finally, through his research, the author found more questions than answers: are the issues addressed in this study the real problem, or are they a symptom of a larger, more significant issue? Specifically, as online learning continues to emerge, more young adults with the potential for officership will be educated away from traditional on-campus environments. How will Army ROTC, and Army's officer accessions process, evolve to inspire, recruit, train, and commission this growing body of talented young men and women?

GLOSSARY

- Cadet.** A college or university student that is simultaneously enrolled in the Army ROTC program with the intent of earning a commission as an Army officer upon graduation
- Cadre.** A person or group of persons assigned to or employed by Army ROTC; whose place of duty is an Army ROTC program at a host institution; who supervises and facilitates tactical training, physical training, and other activities; and, who conducts classroom academics and counseling. Cadre members can be Army service members or DoD contractors.
- Face-to-Face Learning.** Learning that occurs face-to-face, where the student(s) are co-located with the instructor in time and place. Also known as traditional learning or classroom learning.
- Faculty.** A person or group of persons assigned to or employed by a host institution, who teach academic subjects and interact regularly with enrolled students.
- Host Institution.** An accredited college or university that hosts an Army ROTC host or partnership program
- Host Program.** An autonomous Army ROTC program that has its own internal administrative and logistical support, and who reports to a brigade headquarters
- Partnership Program.** A subordinate Army ROTC program that relies on a host program for administrative and logistical support, and who reports to a host program

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